

PM_{2.5} and Electric Power Generation: Recent Findings and Implications



April 9-10, 2002

Omni William Penn Hotel, Pittsburgh, PA

**Sponsored By: U.S. Department of Energy,
Office of Fossil Energy
National Energy Technology Laboratory
(NETL)**



GENERAL INFORMATION

Conference Objectives

This conference will provide a forum for presenting technical information on the:

- Impact of power plant emissions on ambient $PM_{2.5}$, regional haze, and visible plumes;
- Detailed characterization of power plant emissions of $PM_{2.5}$ and its precursors;
- Methods for quantifying the relationships between power plant emissions and chemical composition of $PM_{2.5}$;
- Implications for compliance with current and future air quality regulations, including the National Ambient Air Quality Standards (NAAQS) for $PM_{2.5}$, EPA's Regional Haze Rule, plume opacity and multi-pollutant controls.

Who Should Attend

- Technical, managerial and operations personnel who must understand and mitigate the environmental effects of airborne emissions from power generation facilities
- Regulatory personnel (Federal, State, Regional and Local) involved with the assessment and implementation of ambient air quality and regional haze standards
- Researchers from academia, Government agencies and the private sector who are interested in technical information pertinent to $PM_{2.5}$ and power generation

Location and Accommodations

The Omni William Penn, located at 530 William Penn Place, Pittsburgh, Pennsylvania, is the official hotel for the Conference. It is located in the heart of downtown Pittsburgh, surrounded by shopping, dining, cultural and sporting venues. The Omni is located 18 miles (30 minutes) from the Greater Pittsburgh International Airport.

The Conference rate is \$79.00, plus 14% tax, for single or double occupancy. For reservations, contact the hotel directly at (412) 281-7100. You must reference the U.S. Department of Energy to receive the special group rate listed above. A block of rooms for this conference will be held until March 26, 2002.

Hotel check-in time is 3:00 p.m. and checkout is 12:00 noon.

Transportation

Shuttle: Airlines Transportation Company: \$14.00 one way and \$24.00 round trip (412) 321-4990. No reservations are required. The shuttle service desk is located on the lower level of the airport near the US Airways baggage claim (express shuttle).

Taxi: Approximately \$35.00 one way, to or from the airport. Yellow Cab (412) 665-8100.

Directions from Greater Pittsburgh International Airport:

Follow signs to I-279 North to Pittsburgh (Fort Pitt Bridge and Tunnel); go through the tunnel; take the Liberty Avenue exit; turn right on Sixth Avenue; turn right onto William Penn Place, the hotel is located on the left.

Registration Fee

\$60.00

This fee is to cover the cost of continental breakfasts and conference breaks.

The registration deadline is April 1, 2002. To register, complete the registration form included in this announcement and mail or fax to NETL Event Management. Check or credit card can be used for payment of the registration fee.

All lunches and dinners will be on your own. A list of dining options, many within walking distance of the Omni William Penn, will be provided upon registration.

Foreign National Visitor Notice

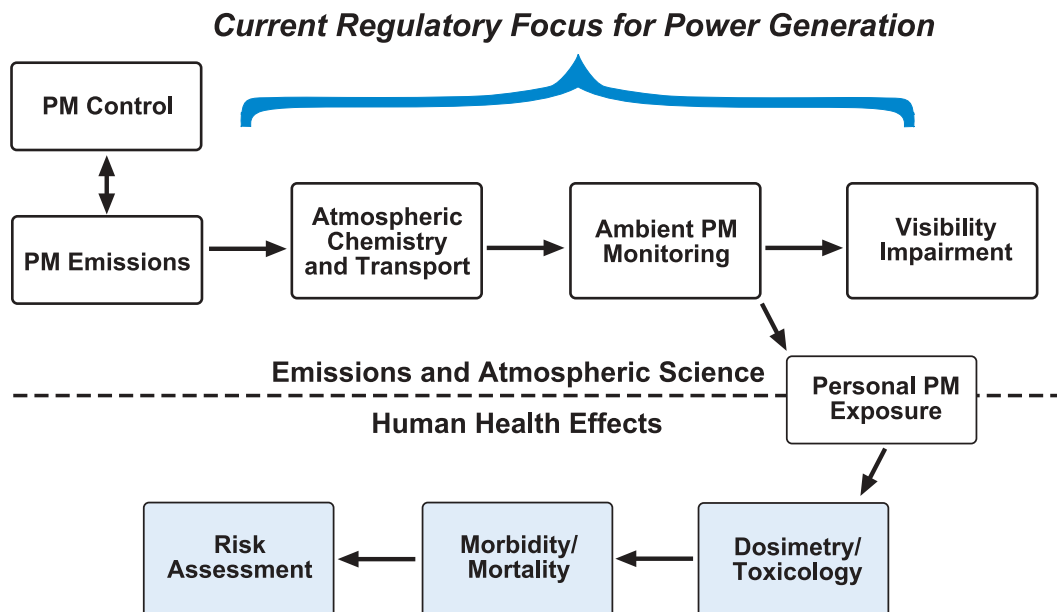
All foreign nationals who wish to attend DOE-sponsored conferences, meetings, workshops or seminars are required to submit NETL Form F142.1-1 requesting a DOE unclassified visit. A minimum of 30 days advance notice is required for the review and approval process for unclassified foreign national visits. A foreign national is any person who is not a U.S. Citizen and includes permanent resident alien (PRA's or "green card holder".)

The NETL Foreign National Visitor Form F142.1-1 is included in this package.

If you have any questions, please call Karen Lockhart, (412) 386-4763 or email karen.lockhart@sa.netl.doe.gov

Visit our web site for updates and electronic versions of registration and foreign national visitor forms.

www.netl.doe.gov (click on events)



AGENDA

PM_{2.5} and Electric Power Generation: Recent Findings and Implications

Tuesday, April 9, 2002

General Session

- 7:00 a.m.** Registration/Continental Breakfast
- 8:00 a.m.** Welcoming Remarks
- 8:20 a.m.** Keynote Presentations
- James Vickery**, EPA Office of Research and Development
- Ronald Wyzga**, Electric Power Research Institute
- John Bachmann**, EPA Office of Air Quality, Planning, and Standards
- Cindy Langworthy**, Hunton & Williams (Utility Air Regulatory Group)

10:20 a.m. Break

Session 1 - Ambient Air Monitoring and Data Analysis

- 10:50 a.m.** Projected PM_{2.5} Attainment Status of Each County in the U.S. Based on 1999-2000 Monitoring Results and Impact on Existing & Proposed New Power Generation Facilities.
Howard Ellis, Nishat Hydari, Adeel Yousuf and Alec Bent, Enviroplan Consulting
- 11:20 a.m.** Regional Composition of PM_{2.5} Measured at Urban, Rural and "Background" Sites in the Tennessee Valley
Roger L. Tanner, William J. Parkhurst, Myra L. Valente and W. David Phillips, Tennessee Valley Authority
- 11:50 p.m.** Lunch (on your own)
- 1:20 p.m.** PM_{2.5} NAAQS & Particulate Matter Composition: An Update
John J. Jansen, Southern Company
- 1:50 p.m.** Southern Fine Particulate Monitoring Project
Ashley D. Williamson, Southern Research Institute
- 2:20 p.m.** Discrete Measurements of PM_{2.5} Mass and Composition in the Southeastern U.S.: Regional and Seasonal Trends between 1999 and Today
K. Baumann, M. Chang, A. Russell, and W.L. Chameides Georgia Institute of Technology
- 2:50 p.m.** Break
- 3:20 p.m.** Comparative Evaluation of Ambient Fine Particulate Matter (PM_{2.5}) Data Obtained from Urban & Rural Monitoring Sites Along the Upper Ohio River Valley
Robinson P. Khosah, and Terence J. McManus Advanced Technology Systems, Inc.

- 3:50 p.m. Evaluation of PM_{2.5} Concentrations Across the Ohio River Valley**
Delbert Eatough, Brigham Young University, *Kevin Crist*, Ohio University, *Kuruvilla John*, Texas A&M, *Richard R. Anderson*, and *Donald V. Martello*, U.S. Department of Energy, National Energy Technology Laboratory
- 4:20 p.m. The Steubenville Comprehensive Air Monitoring Program (SCAMP): Initial Ambient Air Results**
J.A. Withum, *S.E. Winter*, *V.B. Conrad*, and *R.M. Statnick*, CONSOL Energy, Inc.
- 4:50 p.m. The Regional Nature of PM_{2.5} Episodes in South western Pennsylvania**
Richard R. Anderson, *Donald V. Martello*, *Paul C. Rohar* and *Curt M. White*, U. S. Department of Energy, National Energy Technology Laboratory, *Kevin Crist*, Ohio University, *William K. Modey* and *Delbert J. Eatough*, Brigham Young University
- 5:20 p.m. Adjourn Session 1**

Session 2 - Emissions, Atmospheric Chemistry, and Modeling

- 10:50 a.m. Fine Particle Precursor Emissions from Power, Oil and Gas Industry Combustion Sources**
Glenn C. England, *Stephanie Wien*, and *Mingchih Chang*, GE Energy & Environmental Research Corporation, *Dan Gurney*, U.S. Department of Energy, National Petroleum Technology Office, *Karl Loos*, Equilon Technology
- 11:20 a.m. PM and Precursor Emissions from Distributed Generation in Combined Heat and Power Applications**
Neil Strachan, and *Alexander E. Farrell*, Carnegie Mellon Electricity Industry Center (CEIC), Carnegie Mellon University
- 11:50 a.m. Lunch** (on your own)
- 1:20 p.m. Application of Receptor Modeling to Trace the Sources of PM_{2.5} Particles, Hg⁰ and PAHs in New York State**
Wei Liu, *Philip K. Hopke*, *Thomas M. Holsen*, and *Young-ji Han*, Clarkson University, *Scott Cybart* and *Michael Milligan*, SUNY
- 1:50 p.m. Source Apportionment of Fine Aerosol Mass and Chemical Composition in the Suburban Baltimore-Washington Corridor**
L.W. Antony Chen, *Bruce G. Doddridge*, and *Russell R. Dickerson*, University of Maryland
- 2:20 p.m. Contributions of Some Cytokine Active Metals in Ambient Particles Attributed to Coal Combustion by CMB**
J.M. Ondov, and *A.E. Suarez*, University of Maryland

- 2:50 p.m. Break**
- 3:20 p.m. Spatial Variability in Measured Urban Fine Particles**
Robert E. Imhoff, and *Solomon T. Bairai*, Tennessee Valley Authority
- 3:50 p.m. Particle Growth in Industrial and Urban Plumes**
Charles A. Brock, Aeronomy Laboratory, National Oceanic and Atmospheric Administration and Cooperative Institute for Research in the Environmental Sciences, *James Meagher*, Aeronomy Laboratory, National Oceanic and Atmospheric Administration
- 4:20 p.m. Modeled Role of Heterogeneous Chemistry in Regional Sulfate Formation**
Stephen F. Mueller, and *Elizabeth M. Bailey*, Tennessee Valley Authority
- 4:50 p.m. Using Natural ²¹⁰Pb and its Daughters (²¹⁰Bi and ²¹⁰Po) to Estimate Aerosol Residence Times**
Jeffrey S. Gaffney, and *Nancy A. Marley*, Argonne National Laboratory
- 5:20 p.m. Adjourn Session 2**

Wednesday, April 10, 2002

Session 1 - Ambient Air Monitoring and Atmospheric Chemistry

- 7:00 a.m. Registration/Continental Breakfast**
- 8:00 a.m. Direct Reaction Cell ICP-MS vs. XRF: Which is the Superior Technique for the Analysis of Water Soluble and Total Elements in Fine Particulate Matter?**
V.B. Conrad, and *S.E. Winter*, CONSOL Energy, Inc. *James Ross*, Columbia University
- 8:30 a.m. Fossil Sources of PM_{2.5} Aerosol Carbon Based on ¹⁴C Measurements**
Roger L. Tanner, and *William J. Parkhurst*, Tennessee Valley Authority, *A.P. McNichol*, Woods Hole Oceanographic Institute
- 9:00 a.m. Characterization of Ambient Air PM_{2.5} in the Pittsburgh Region**
Donald V. Martello, *Richard R. Anderson*, *Paul C. Rohar*, and *Curt M. White*, U.S. Department of Energy, National Energy Technology Laboratory *Steven F. Schlaegle*, *Traci L. Lersch*, and *Gary S. Casuccio*, RJ Lee Group, Inc.
- 9:30 a.m. Characterization of Fine Particulate Matter at Elementary Schools in Central and Southeastern Ohio**
Kevin Crist, Ohio University, *Amol Kulkarni*, *Sunil Kumar*, and *Kuruvilla John*, Texas A&M University
- 10:00 a.m. Break**

- 10:30 p.m.** **Correlation Between PM_{2.5} Mass, Aerosol Constituents (EC and SO₄²⁻), and Their Precursors for Different Averaging Times: Source Impact Indicator**
Roger L. Tanner, and Solomon T. Bairai, Tennessee Valley Authority
- 11:00 p.m.** **Resolution of Contributions of Primary Particle Constituents from Individual Power Plants with SEAS**
J.M. Ondov, C.B. Kidwell, D.H. Catino, J. Moore Y.C. Chang, and J.P. Pancras, University of Maryland
- 11:30 p.m.** **Seasonal Composition of PM_{2.5} and Performance of the Federal Reference Method in Pittsburgh**
Sarah L. Rees, Satoshi Takahama, Allen L. Robinson, Andrey Khlystov, and Spyros N. Pandis, Carnegie Mellon University
- 12:00 noon** **Lunch (on your own)**
- 1:30 a.m.** **Airborne Measurements of Chemistry and Aerosol Optical Properties During the UORVP and ESP01 Summer 2001 Intensives**
Bruce G. Doddridge, University of Maryland
- 2:00 a.m.** **Continuous Measurements of Ammonia, Sulfate and Nitrate in Pittsburgh: Implications for PM_{2.5} Control Strategies**
Beth Wittig, Andrey Khlystov, Satoshi Takahama, Cliff Davidson, Allen Robinson, Susanne Hering, and Spyros Pandis, Carnegie Mellon University,
- 2:30 a.m.** **The Contribution of Long-Range Transport and Secondary Organic Aerosol to PM_{2.5} in Pittsburgh**
Juan Carlos Cabada-Amaya, Ramachandran Subramanian, Spyros N. Pandis, Allen L. Robinson, Wei Tang, Natalie J. Anderson, Timothy Raymond, and Cliff I. Davidson, Carnegie Mellon University
- 3:00 p.m.** **Break/Adjourn Session 1**

Session 2 - Emissions Characterization and Regional Modeling

- 7:00 a.m.** **Registration/Continental Breakfast**
- 8:00 a.m.** **Molecular Structure and Microstructure of Primary PM_{2.5} Derived from the Combustion of Coal and Residual Oil**
Gerald P. Huffman, Frank E. Huggins, Tomoyoshi Shoji, Sidharta Pattanaik, and Naresh Shah, University of Kentucky
- 8:30 a.m.** **Formation and Speciation of Arsenic-, Chromium-, and Nickel-Bearing PM_{2.5} Produced in a 7-kW Coal Combustion System**
Kevin C. Galbreath, Donald L. Toman, and Christopher J. Zygarlicke, Energy & Environmental Research Center, University of North Dakota

- 9:00 a.m.** **Influence of Biomass Cofiring on PM_{2.5} Ash Produced in a 7-kW Coal Combustion System**
Bruce C. Folkedahl, Christopher J. Zygarlicke, and Josh Strege, Energy & Environmental Research Center, University of North Dakota
- 9:30 a.m.** **PM_{2.5} Characterization for Low-NO_x Coal Combustion**
Ralph T. Bailey, Hamid Sarv, James J. Warchol, and Deborah Madden Yurchison, McDermott Technology, Inc.
- 10:00 a.m.** **Break**
- 10:30 a.m.** **Sampling PM_{2.5} Emissions from Coal Combustion: Effects of Dilution Ratio and Residence Time**
Eric Lipsky, Charles O. Stanier, Spyros N. Pandis, and Allen L. Robinson, Carnegie Mellon University
- 11:00 a.m.** **Fine Particles Generated from the Combustion of Fossil Fuels: Physicochemical Characterization and Direct Inhalation Toxicity Studies at EPA**
C.A. Miller, W.P. Linak, M.I. Gilmour, and Q.T. Krantz, U.S. Environmental Protection Agency, C. King, and D. Santoianni, ARCADIS Geraghty & Miller, Inc., J.O.L. Wendt, University of Arizona
- 11:30 a.m.** **Considerations in Source PM_{2.5} Measurement Methodology Development for Industrial Combustion Emissions**
S. Win Lee, R. Pomalis, I. He, and B. Young, CANMET Energy Technology Centre
- 12:00 noon** **Lunch (on your own)**
- 1:30 p.m.** **Overview of DOE-EPRI-TVA PM_{2.5} Model Study**
Robert E. Imhoff, Elizabeth M. Bailey, and Stephen F. Mueller, Tennessee Valley Authority
- 2:00 p.m.** **An Evaluation of Models-3 Determination of PM_{2.5} During the 1999 SOS Nashville Study**
Elizabeth M. Bailey, and Robert E. Imhoff, Tennessee Valley Authority
- 2:30 p.m.** **Modeling the Impact of Power Plant Emissions to Regional Haze in Big Bend National Park with Models-3/CMAQ**
Naresh Kumar, EPRI, Christian Seigneur, Shiang-Yuh Wu, and Betty Pun, Atmospheric and Environmental Research, Inc.
- 3:00 p.m.** **Break**
- 3:30 p.m.** **PM_{2.5} Sulfate and Organic Carbon Estimates for 2010**
Stephen F. Mueller, Tennessee Valley Authority, J.W. Boylan, A.G. Russell, M.T. Odman and J.W. Wilkinson, Georgia Institute of Technology
- 4:00 p.m.** **Geographic Sensitivity of PM_{2.5} Mass to Large Point Source Emissions**
Stephen F. Mueller, and Elizabeth M. Bailey, Tennessee Valley Authority
- 4:30 p.m.** **Wrap-up**
- 4:45 p.m.** **Adjourn**

POSTERS

Attainability of the PM_{2.5} Standard for Selected Tennessee Valley Cities

Stephen F. Mueller, Tennessee Valley Authority

Temporal and Spatial Fine Particle Trends in the Tennessee Valley

William J. Parkhurst, Roger L. Tanner, Myra L. Valente, and K. Lynn Humes, Tennessee Valley Authority, E. Robert Brawner and Jackie L. Waynick, Tennessee Division of Air Pollution Control, Kathy Jones, Chattanooga-Hamilton County Air Pollution Control Bureau

Recent Trends in Ambient Sulfate Aerosol

Stephen F. Mueller, Tennessee Valley Authority

Using Natural ⁷Be to Evaluate Upper-Air Transport of Aerosols and Gases in the Troposphere

Nancy A. Marley and Jeffrey S. Gaffney, Argonne National Laboratory

Measured Sulfate Formation Rates Before and After Installation of Scrubbers

Roger L. Tanner, Robert E. Imhoff and Ralph J. Valente, Tennessee Valley Authority, Menachem Luria, Hebrew University

Application of Wet Electrostatic Precipitation Technology in the Utility Industry for PM_{2.5} Control

Isaac Ray and Wayne Buckley, Croll-Reynolds Clean Air Technologies

Lowering the Cost of PM 2.5 Compliance with a New Design Wet Membrane ESP

John Caine, Southern Environmental, Inc.

Advanced Hybrid™ Filter

Craig Rinschler, and Rich Gebert, W.L. Gore & Associates

A New Approach to Characterizing Organic Aerosol (Wood Smoke and Diesel Exhaust Particulate) Using Subcritical Water Fractionation

A. Kubatova, M. Fernandez, and S.B. Hawthorne, Energy and Environmental Research Center, University of North Dakota

Performance of an Air Quality Model Across a Range of Environmental Conditions

Stephen F. Mueller, Tennessee Valley Authority, J.W. Boylan, A.G. Russell, M.T. Odman, and J.W. Wilkinson, Georgia Institute of Technology

Evaluation of the Meteorologically Adjusted Air Quality Trends in Ohio

Kuruvilla John, Myoungwoo Kim, and Ieesuck Jung, Texas A&M University, Kevin Crist, Ohio University

NARSTO Air Quality Data Management

Jeffrey L. West, NARSTO



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